

REMARKS

In response to the Office Action mailed May 28, 2004, Applicant respectfully requests reconsideration. To further the prosecution of this application, the indicated claim amendments are submitted with the following discussion.

Claims 1-18 and 27-34 were pending in this application. Claims 1, 12, 14, 17, 27 and 31-34 have been amended. New claims 35-39 have been added. Thus, claims 1-18 and 27-39 are pending with claims 1, 12, 17 and 27 being independent claims.

I. Telephone Interview

Applicant appreciates the courtesies extended by Examiner Munson in granting and conducting the telephone interview of June 10, 2004. In that interview, Applicant alerted the Examiner to the Information Disclosure Statement (IDS) and the Response to Advisory Action, both mailed on May 18, 2004, and not considered in the present Office Action. The Examiner indicated that he was not in possession of the mentioned documents when drafting the present Office Action, despite the fact that the mailing date of the documents proceeded the completion date of the present Office Action. The Examiner agreed to consider the documents upon receiving this present amendment.

During the telephone interview, the Examiner also clarified the remarks on page 5 of the Office Action, pertaining to the comment that it is not proper to read limitations appearing in the specification into a claim, allegedly in contrast to the remarks submitted in the March 8, 2004 amendment. The Examiner clarified that he had understood those remarks as indicating that the structures of the references serving as a basis of the rejections in the Office Action (for example, U.S. Patent No. 4,242,694 to Koike et al.) differed from the claimed structure in that the asserted references do not teach the appropriate numerical thicknesses of insulating and conductive layers to form an interference filter. The Examiner therefore inferred that the amendment of March 8, 2004 was arguing that the thickness limitations indicated on page 3, lines 29-31 of the specification should be read into the claims. However, Applicant's representatives clarified during the interview that the amendment of March 8, 2004 did not argue for the numerical limitations of the specification to be read into the claims. Rather, the amendment of March 8,

2004 argued, in part, that the terminology “interference filter” implies certain structural and functional limitations to those of skill in the art, and that the proper weight must be accorded when interpreting the term “interference filter.”

Furthermore, during the telephone interview the patentability of the claims was discussed in relation to the asserted references. While Applicant’s representatives contended that the claims, at the time of the interview, distinguished over the asserted references, the Examiner did not agree. The Examiner suggested that further limitations needed to be added to the claims to clearly distinguish the claimed structures over the structures of the references. No agreement was reached as to the patentability of the claims.

II. Claim Rejections under 35 U.S.C. § 112

Claims 31-34 stand rejected under 35 U.S.C. § 112, first and second paragraphs. During the telephone interview, the Examiner clarified the basis of these rejections. The Examiner stated that the use of the term “effective” to describe the capacitance in claims 31-34 renders the claims unclear. Further, the Examiner stated that the limitation of increasing the effective capacitance of the photodiode should be altered to clearly indicate that the increased capacitance is in parallel to the photodiode, as illustrated in Figure 1B of the application.

Applicant respectfully disagrees with these rejections. The term “effective” in describing the capacitance is well known to one of skill in the art, and is not unclear. Furthermore, the limitation “increases the effective capacitance of the photodiode” is accurate since the capacitance in parallel functions to *increase the effective capacitance* of the photodiode.

Despite this position, Applicant has amended claims 31-34 for purposes of clarification only. As amended, claims 31-34 overcome the rejections under 35 U.S.C. § 112, first and second paragraphs. Therefore, Applicant respectfully requests that these rejections be withdrawn.

III. Independent Claim Rejections Under 35 U.S.C. § 102 and § 103

Claims 1-6, 8, 12-15, 17, and 28-33 stand rejected under 35 U.S.C. § 103 as purportedly being unpatentable over U.S. Pat. No. 4,242,694 to Koike et al. (hereinafter Koike). Claims 12,

13, 17, 32 and 33 stand rejected under 35 U.S.C. § 102 as purportedly being unpatentable over U.S. Pat. No. 5,502,488 to Nagasaki et al. (hereinafter Nagasaki). Claims 27 and 34 stand rejected under 35 U.S.C. § 103 as purportedly being unpatentable over Koike considered together with U.S. Pat. No. 5,614,744 to Merrill. Claims 12, 17, 18, 27, and 32-34 stand rejected under 35 U.S.C. § 102 as purportedly being unpatentable over U.S. Pat. No. 4,996,578 to Motojima et al. (hereinafter Motojima).

Applicant has previously disagreed with these rejections, for example, in the amendment mailed March 8, 2004. Applicant maintains this position, and hereby incorporates the amendment, and arguments therein, of March 8, 2004 by reference. The arguments in that amendment are not repeated here for purposes of brevity. A discussion of the cited references is also included in the March 8, 2004 amendment and is not repeated here for purposes of brevity.

A. Claims 1-6, 8, 12-15, 17, and 28-33 Distinguish and Are Non-Obvious Over Koike

Claims 1-6, 8, 12-15, 17, and 28-33 stand rejected under 35 U.S.C. § 103 as purportedly being unpatentable over Koike. Applicant respectfully traverses this rejection.

Claim 1

Claim 1 is directed to an array of photodiodes made of regions of a second conductivity type formed in a semiconductive region of a first conductivity type. The array of photodiodes is divided into three interleaved sub-arrays, each sub-array corresponding to a respective color of light. All photodiodes of a respective sub-array are coated with a same interference filter including at least one insulating layer of determined thickness coated with at least one conductive layer. A combined thickness of the at least one insulating layer and the at least one conductive layer is different for each sub-array, the determined thickness of said at least one insulating layer and said at least one conductive layer coating the respective sub-array determining the respective color of light that is interferentially filtered and provided to the respective sub-array. Claim 1 further includes the limitation wherein the determined thickness of said at least one insulating layer is proportional to the wavelength of the color of light that is interferentially filtered. Claim 1 further includes the limitation wherein said at least one conductive layer is electrically connected to the semiconductive region of the first conductivity

type. Support for the amendments to claim 1 may be found, for example, on page 2, line 30-page 3, line 2, and on page 3, lines 29-31 of the present application.

Koike does not teach or suggest several of the limitations of claim 1, as previously discussed in the March 8, 2004 amendment. Furthermore, Koike does not teach or suggest that the determined thickness of said at least one insulating layer is proportional to the wavelength of the color of light that is interferentially filtered. By contrast, the thickness of the silicon oxide layers 12R, 12G, and 12B of Koike, which the Office Action correlates to the claimed at least one insulating layer, are chosen based on equations (3), (4), and (5) (col. 7, lines 31-38), which also require use of equations (1) and (2) of Koike. These equations pertain to controlling the capacitance of the structure, and not to the wavelength of the color of light that is interferentially filtered. Accordingly, Applicant respectfully requests that the rejection of claim 1 under 35 U.S.C. § 103 be withdrawn.

Claims 2-11, 28-31, 35 and 36 depend from claim 1 and are allowable for at least the same reasons.

Claim 12

Claim 12 is directed to a photodiode. The photodiode comprises a semiconductor substrate of a first conductivity type, a semiconductive region of a second conductivity type formed in said semiconductor substrate, and a multilayer interference filter disposed over said semiconductive region. The multilayer interference filter includes at least one insulating layer having a predetermined thickness, and a conductive layer disposed over said at least one insulating layer. Said conductive layer includes a conductive portion that electrically connects said conductive layer to said semiconductor substrate of the first conductivity type. The predetermined thickness of said at least one insulating layer, in combination with said conductive layer, is adapted to interferentially filter a particular wavelength of light. The predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light. Support for the amendments to claim 12 may be found, for example, on page 2, line 30-page 3, line 2, and on page 3, lines 29-31 of the present application.

As discussed in connection with claim 1, Koike does not teach or suggest a multilayer interference filter including at least one insulating layer having a predetermined thickness,

wherein the predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light, as claimed. Thus, Applicant respectfully requests that the rejection of claim 12 under 35 U.S.C. § 103 be withdrawn.

Claims 13-16, 32 and 37 depend from claim 12 and are allowable for at least the same reasons.

Claim 17

Claim 17 is directed to a photodiode. The photodiode comprises a semiconductor substrate of a first conductivity type, a semiconductive region of a second conductivity type formed in said semiconductor substrate, and a multilayer interference filter disposed over said semiconductive region. The multilayer interference filter includes at least one insulating layer having a predetermined thickness, a conductive layer disposed over said at least one insulating layer, and means defining a conductive portion that electrically connects said conductive layer to said semiconductor substrate of the first conductivity type. The predetermined thickness of said at least one insulating layer, in combination with said conductive layer, is adapted to interferentially filter a particular wavelength of light. The predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light.

As with claims 1 and 12, the claimed interference filter is not taught or suggested by Koike, contrary to the assertion in the Office Action. For example, Koike fails to teach or suggest a multilayer interference filter including at least one insulating layer having a predetermined thickness, wherein the predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light, as claimed. Therefore, Applicant respectfully requests that the rejection of claim 12 under 35 U.S.C. § 103 be withdrawn.

Claims 18, 33 and 38 depend from claim 17 and are allowable for at least the same reasons.

B. Claims 12, 13, 17, 32 and 33 Distinguish and Are Non-Obvious Over Nagasaki

Claims 12, 13, 17, 32 and 33 stand rejected under 35 U.S.C. § 102 as purportedly being unpatentable over Nagasaki.

Claim 12

As explained in subsection III.A of this amendment, claim 12 is directed to a photodiode comprising, *inter alia*, a multilayer interference filter. The multilayer interference filter includes, *inter alia*, at least one insulating layer having a predetermined thickness, wherein the predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light.

Nagasaki fails to teach or suggest that layer 4, which the Office Action correlates to the claimed at least one insulating layer, has a thickness proportional to a wavelength of light to be interferentially filtered. In fact, Nagasaki does not even discuss interference effects. Accordingly, Applicant respectfully requests that the rejection of claims 12 under 35 U.S.C. § 102 be withdrawn.

Claims 13-16, 32 and 37 depend from claim 12 and are allowable for at least the same reasons.

Claim 17

As discussed in subsection III.A of this amendment, claim 17 is directed to a photodiode comprising, *inter alia*, a multilayer interference filter. The multilayer interference filter includes, *inter alia*, at least one insulating layer having a predetermined thickness, wherein the predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light.

Nagasaki fails to teach or suggest at least this limitation of claim 17. Accordingly, Applicant respectfully requests that the rejection of claims 17 under 35 U.S.C. § 102 be withdrawn.

Claims 18, 33 and 38 depend from claim 17 and are allowable for at least the same reasons.

C. Claims 27 and 34 Distinguish and Are Non-Obvious Over the Combination of Koike and Merrill

Claims 27 and 34 stand rejected under 35 U.S.C. § 103 as purportedly being unpatentable over Koike considered together with Merrill. Applicant respectfully traverses this rejection

Claim 27

Claim 27 is directed a photodiode. The photodiode comprises a semiconductor substrate of a first conductivity type, a semiconductive region of a second conductivity type formed in said semiconductor substrate, and a multilayer interference filter disposed over said semiconductive region. The multilayer interference filter includes at least one insulating layer having a predetermined thickness, and a conductive layer disposed over said at least one insulating layer. The semiconductor substrate defines a well formed in a base substrate of the second conductivity type, said conductive layer being electrically connected to said base substrate. The predetermined thickness of said at least one insulating layer, in combination with said conductive layer, is adapted to interferentially filter a particular wavelength of light. The predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light. Support for the amendments to claim 27 may be found, for example, on page 2, line 30-page 3, line 2, and on page 3, lines 29-31 of the present application.

The combination of Koike and Merrill, even if proper, does not teach all the limitations of claim 27. For example, neither Koike nor Merrill teach or suggest a photodiode comprising, *inter alia*, a multilayer interference filter including, *inter alia*, at least one insulating layer having a predetermined thickness, wherein the predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light. Accordingly, Applicant respectfully requests that the rejection of claim 27 under 35 U.S.C. § 103 be withdrawn.

Claims 34 and 39 depends from claim 27 and are allowable for at least the same reasons.

D. Claims 12, 17, 18, 27, and 32-34 Distinguish Over Motojima

Claims 12, 17, 18, 27, and 32-34 stand rejected under 35 U.S.C. § 102 as purportedly being unpatentable over Motojima. Applicant respectfully traverses this rejection.

Each of independent claims 12, 17, and 27 recite a limitation of a multilayer interference filter including, *inter alia*, at least one insulating layer having a predetermined thickness, wherein the predetermined thickness of said at least one insulating layer is proportional to the particular wavelength of light.

Motojima does not teach or suggest that the layer 6₂, which the Office Action correlates to the claimed at least one insulating layer, has a predetermined thickness proportional to the

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particular wavelength of light. Accordingly, Applicant respectfully requests that the rejection of claims 12, 17, and 27 under 35 U.S.C. § 102 be withdrawn.

Claims 13-16, 32 and 37 depend from claim 12 and are allowable for at least the same reasons.

Claims 18, 33 and 38 depend from claim 17 and are allowable for at least the same reasons.

Claims 34 and 39 depends from claim 27 and are allowable for at least the same reasons.

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CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

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